

## OBSERVATIONS AT HONOLULU.

Through the kind cooperation of Mr. Curtis J. Lyons, Meteorologist to the Government Survey, the monthly report of meteorological conditions at Honolulu is now made nearly in accordance with the new form, No. 1040, and the arrangement of the columns, therefore, differs from those previously published.

*Meteorological observations at Honolulu, June, 1899.*

The station is at 21° 18' N., 157° 50' W.  
Pressure is corrected for temperature and reduced to sea level, and the gravity correction, -0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force or amounts of cloudiness, connected by a dash, indicate change from one to the other.

The rainfall for twenty-four hours has always been measured at 7:30 p. m., not 1 p. m., Greenwich time, on the respective dates.

The rain gauge, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet, and the barometer 50 feet above sea level.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p.m., Greenwich time, or 2:30 a. m., Honolulu time.								Total rainfall at 9 a. m., local time.	
				Temperature.		Means.		Wind.		Average cloudiness.	Sea-level pressures.		
		Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Force.		Maximum.		Minimum.
1.....	30.02	71	67	81	73	62.5	64	ene.nne	5-3	3	30.11	30.01	0.04
2.....	30.00	73	67.5	81	71	64.7	73	ne.	4-2	4	30.08	29.98	0.03
3.....	30.08	72	68.5	82	70	64.5	68	ne.	3	3	30.06	29.99	0.00
4.....	30.01	73	67	82	72	64.3	66	ne.	3-4	3-6	30.08	30.01	0.00
5.....	30.00	73	67.5	84	72	64.0	65	ne.	3	3-6	30.08	29.99	0.01
6.....	30.00	73	67	84	73	63.7	64	ene.	3-1	6-2-7	30.08	29.98	0.00
7.....	29.99	68	66.5	82	70	63.5	64	nne.	3-0	2-8	30.04	29.94	0.01
8.....	30.01	73	65	82	68	63.0	71	ne.	3-0	3-8	30.05	29.97	0.00
9.....	30.08	72	66	82	72	61.0	60	ne.	4	4	30.07	30.02	0.04
01.....	30.00	71	66	82	70	62.5	64	nne.	4	3	30.08	30.00	0.05
11.....	30.00	71	66	81	70	63.0	68	ne.	4	3	30.04	29.96	0.06
12.....	30.01	72	65.5	82	69	63.0	63	ne.	4	3-1	30.04	29.97	0.04
13.....	30.00	71	66.5	81	70	63.7	68	ne.	4	3-7	30.05	29.99	0.05
14.....	30.08	71	64.5	83	69	63.0	67	nne.	3	3	30.08	30.00	0.00
15.....	30.04	72	65	84	71	60.3	80	nne.	3	2-4	30.08	30.00	0.00
16.....	30.04	73	64	82	70	61.5	63	ne.	3	3	30.07	30.01	0.00
17.....	30.00	72	66	81	72	60.7	80	ne-nne.	3-5	5	30.07	29.99	0.03
18.....	30.01	72	66.5	81	69	62.7	65	ne.	4	2-4	30.05	30.00	0.04
19.....	30.04	71	66	84	70	63.3	65	ne.	3	4	30.07	30.02	0.11
20.....	30.08	72	65.5	82	69	62.5	65	nne.	4	4	30.09	30.01	0.02
21.....	29.98	72	64.5	82	70	62.0	68	ne-nne.	3	1	30.09	29.98	0.00
22.....	29.99	70	67	83	72	62.0	63	ne.	3-5	2-6	30.05	29.98	0.20
23.....	30.00	74	66.5	82	69	64.3	71	ne.	3-5	3-3	30.03	29.98	0.11
24.....	30.02	74	66	82	72	62.7	63	ene.	5	3-8	30.06	29.98	0.09
25.....	30.01	72	66	83	70	63.3	64	ne.	4	4	30.07	29.99	0.08
26.....	29.98	73	65	83	72	66.5	73	ne.	3	2-8	30.06	29.98	0.11
27.....	29.96	73	66.5	81	70	66.0	72	ene.	3	4	30.01	29.93	0.01
28.....	29.95	73	65.5	83	71	63.0	69	ne.	3	1	30.01	29.94	0.00
29.....	29.97	73	67.5	83	73	61.5	60	ne.	3	3	30.03	29.97	0.02
30.....	29.95	70	65.5	83	70	64.5	67	ne.	3	2	30.02	29.94	0.04
Sums..													1.14
Means.	30.008	72.0	66.3	82.3	70.6	63.1	65.4			3-6	30.058	29.983	
Departure..	+0.008					-2.2	-5.0			-0.2			-0.40

Mean temperature for June, 1899 (6+2+9)+3=75.3°; normal is 76.1°. Mean pressure for June (9+3)+2 is 30.021; normal is 30.013.

\*This pressure is as recorded at 1 p. m., Greenwich time. †These temperatures are observed at 6 a. m., local, or 4:30 p. m., Greenwich time. ‡These values are the means of (6+9+2+9)+4. §Beaufort scale.

SOME PHYSICAL FEATURES AND FLOOD CONDITIONS OF THE JAMES RIVER VALLEY.<sup>1</sup>

By EDWARD A. EVANS, Section Director, Richmond, Va.

The sources of the James River have their rise in the elevated valleys of the central Appalachian range, about 1,800 feet above sea level. Descending rapidly and flowing in a generally easterly direction, the stream crosses the valley of

<sup>1</sup>The following is a selection of paragraphs from a paper under the above title, published in the Annual Summary for 1898 of the Virginia Section of the Climate and Crop Service. The general treatment of the subject by Mr. Evans seems to the Editor to offer an excellent model for similar work on other river basins. We have omitted only the large hydrographs of the James River for the year 1898 at Richmond and Lynchburg. The elevations of the zeros of the gages are, respectively, 2.8 and 499 feet above mean sea level. The danger lines are, respectively, 12 and 18 feet above the zeros. Therefore, that portion of the river below Richmond is essentially an arm of the sea.—En.

Virginia through Botetourt County and forces its passage through the Blue Ridge at Balcony Falls, in the extreme southeast corner of Rockbridge County, at an elevation of about 700 feet above sea level, or about twice the elevation of the Potomac River at the point where it breaks through the same barrier.

Entering the Piedmont district, it continues its easterly direction until it reaches the middle counties proper, when it swings abruptly to the northeast, which course it pursues until near the thirty-eighth parallel of latitude, when it again resumes its generally eastward trend, entering tidewater at the foot of the falls at Richmond.

Its main tributaries are the Jackson, Cowpasture, Craig, and North rivers in the Appalachian and valley division, the Pedlar, Tye, and Rockfish rivers in the Piedmont division, and the Slate, Willis, and Rivanna rivers in the middle division. There are also several large tributaries flowing in below Richmond, but they are not material for the purpose of this article, which is intended simply to set forth briefly some facts concerning the area and soil conditions of the James basin, and the movement of flood waves from its headwaters to the head of tidewater at Richmond, or what may be considered as the flood district.

It is interesting to note, as showing the physical characteristics of this great watershed, that nearly all of the rivers entering the James come in from the north, where the slope from the crest of the basin to the river level is gradual, and the area large. On the south side it is mostly abrupt and contracted, draining, as a rule, a narrow strip of land contiguous to the main stream. A striking illustration of this feature may be found in Campbell County, where the Falling River, which rises only some 5 miles from the James, flows southward into the Roanoke.<sup>2</sup>

A portion of the country immediately adjacent to the south bank of the James is, therefore, the northern limit of the watershed of all the Virginia rivers which pass out of the State into North Carolina.

The counties and parts of counties comprising that portion of the James basin which is under consideration, are twenty in number, extending from the Alleghenies to the extreme eastern portion of the middle division, inclusive, a majority of which lie on the north side of the river. Their area, roughly, is about 4,390,000 acres.

A brief description of their topography and soil characteristics may be admissible here, as germane to the subject to the extent that a steep land gradient and a hard, compacted, or loose, porous condition of the soil, affords some indication of the probable amount of water which will reach the draining stream under various conditions of precipitation.

In the Appalachian counties are found all the surroundings favorable to rapid drainage. The face of the country is rugged and mountainous, with steep descents from mountain top to valley. The soil is loose and porous; shallow, except in the valleys, and rests upon the solid rock, and hence all moisture in excess of that required to wet it may be expected to quickly reach its outlet. The dip of the basin is mostly eastward.

In the valley counties of the basin, the contour of the land becomes generally undulating, with occasional spurs or headlands of the Alleghenies and Blue Ridge projecting into it. The fall of the land is generally east and south over the northern basin, and east and north in the southern basin. The prevailing soil is a clay loam of great natural fertility. It lacks the looseness and porosity of the Appalachian soils, and sheds a larger percentage of moisture, especially during

<sup>2</sup>Since this article first appeared I have been informed by Mr. Murrell, voluntary observer, at Coleman's Falls, Bedford County, that on his farm the divide approaches to within a mile or a mile and a half of the river. The upheaved rock takes a course parallel with the river for a distance of 50 miles or more.—E. A. E.